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विद्युत तकनीकी शब्दावली

भाग 84 विद्युत तकनीकी उत्पादों के अग्नि परीक्षण से संबंधित शब्दावली

(पहला पुनरीक्षण)

Indian Standard

ELECTROTECHNICAL VOCABULARY

PART 84 TERMINOLOGY CONCERNING FIRE TESTS FOR ELECTROTECHNICAL PRODUCTS

(First Revision)

ICS 01.040.13; 29.020

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NEW DELHI 110002

September 2008

Price Group 7

Environmental Testing Procedures Sectional Committee, LITD 01

NATIONAL FOREWORD

This Indian Standard (Part 84) (First Revision) which is identical with IEC 60695-4 : 2005 'Fire hazard testing — Part 4: Terminology concerning fire tests for electrotechnical products' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Environmental Testing Procedures Sectional Committee and approval of the Electronics and Information Technology Division Council.

This standard was first published in 2001. This first revision has been undertaken to align it with latest IEC publication of IEC 60695-4 : 2005.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard, which is to be substituted in its respective place, is listed below along with its degree of equivalence for the edition indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO/IEC Guide 51[1] : 1999 Safety aspects — Guidelines for their inclusion in standards	IS/ISO/IEC Guide 51 : 2005 Safety aspects — Guidelines for their inclusion in standards	Technically Equivalent

The technical committee responsible for the preparation of this standard has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standard	*Title*
IEC Guide 104 : 1997	The preparation of safety publications and the use of basic safety publications and group safety publications
ISO/IEC 13943 : 2000	Fire safety — Vocabulary

Only the English language text in the International Standard has been retained while adopting it as an Indian Standard, and as such the page numbers given here are not the same as in the IEC Publication.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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[1] Since revised in 2005.

IS 1885 (Part 84) : 2008
IEC 60695-4 : 2005

Indian Standard

ELECTROTECHNICAL VOCABULARY

PART 84 TERMINOLOGY CONCERNING FIRE TESTS FOR ELECTROTECHNICAL PRODUCTS

(First Revision)

1 Scope

The terms and definitions defined in this standard are applicable to fire tests for electrotechnical products.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications in the preparation of its publications.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

ISO/IEC 13943:2000, *Fire safety – Vocabulary*

ISO/IEC Guide 51:1999. *Safety aspects – Guidelines for their inclusion in standards*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. Some of the terms and definitions listed appear in ISO/IEC 13943.

3.1
abnormal heat
heat that is additional to that resulting from use under normal conditions, up to and including that which causes a fire situation

3.2
acute toxicity
ability of a substance to produce rapidly occurring adverse effects upon a living organism

3.3
afterflame time
the length of time during which an afterflame persists (also called duration of flaming)

3.4
afterglow time
the time length of during which an afterglow persists

3.5
asphyxiant
toxicant causing loss of consciousness and ultimately death resulting from hypoxic effects, particularly on the central nervous and/or cardiovascular systems

3.6
burned area
the area of a material that has been destroyed by combustion or pyrolysis, under specified test conditions, excluding any area damaged only by deformation

NOTE Expressed in m^2

3.7
char (verb)
to form char

3.8
corrosion damage
the physical and/or chemical damage or impaired function caused by the fire effluent especially by chemical action

3.9
corrosion target
the sensor – product, component, or a reference material simulating them – used to determine the degree of corrosion damage, under specified test conditions

3.10
detonation
an explosion propagating at supersonic velocity and characterized by a shock wave

3.11
draught free environment
an environment in which the results of experiments are not significantly affected by the local air speed, for example:

a) qualitatively, an environment in which a wax candle flame remains essentially undisturbed;

b) quantitatively, an environment in which the air speed is not greater than 0,1 m/s

3.12
ease of ignition
the ease with which a specimen can be ignited under specified test conditions (see also *exposure time* and *minimum ignition time*)

3.13
effective exposure concentration 50
EC_{50}
concentration of a toxicant, or mixture of toxicants, statistically calculated from concentration response data over time that causes a specific observed effect in 50 % of a population of a given species under specific conditions

NOTE The observed effect is typically either a behavioural response of incapacitation or death. The effective concentration for a lethal exposure is termed "LC_{50}", the lethal concentration.

3.14
exposure dose
quantity of gaseous toxicant or a fire effluent which is available for inhalation, i.e. the integrated area under either the concentration-time curve or the volume fraction-time curve

NOTE It is usually expressed in units of $g \times min \times m^{-3}$ or $10^{-6} \times min$.

3.15
exposure time
the specified length of time for which a material is exposed to an ignition source (see also *ease of ignition* and *minimum ignition time*)

NOTE Expressed in seconds (s).

3.16
extent of combustion
the maximum length of a material that has been destroyed by combustion or pyrolysis, under specified test conditions, excluding any region damaged only by deformation

3.17
extinction area of smoke
product of the extinction coefficient and the volume occupied by the smoke

NOTE It is a measure of the amount of smoke.

3.18
extinction coefficient of smoke
natural logarithm of the opacity of smoke divided by the path length of the light used to measure the smoke opacity

3.19
fire

a) a process of combustion characterized by the emission of heat and effluent accompanied by smoke, and/or flame, and/or glowing;

b) rapid combustion spreading uncontrolled in time and space

3.20
fire barrier
a part able to provide simultaneously a given fire integrity and thermal insulation under specified test conditions

3.21
fire behaviour
the change in, or maintenance of the physical and/or chemical properties of a material, product and/or structure exposed to fire

NOTE This concept includes both reaction to fire and fire resistance.

3.22
fire compartment
an enclosed space, comprising one or more rooms, bounded by elements of construction having a specified fire resistance and intended to prevent spreading of fire for a given period of time

3.23
fire effluent
the total gaseous, particulate or aerosol effluent from combustion or pyrolysis

3.24
fire effluent decay characteristics
the physical and/or chemical change in fire effluent due to time and transport

3.25
fire effluent transport
the movement of fire effluent away from the location of the fire

3.26
fire hazard
the potential for injury or loss of life and/or damage to property by fire

3.27
fire integrity
the ability of a separating element when exposed to fire on one side, to prevent the passage through it of flames and hot gases or the occurrence of flames on the unexposed side, for a stated period of time in a standard fire resistance test

3.28
fire load
the sum of the calorific energies which could be released by the complete combustion of all of the combustible materials in a space, including the facings of the walls, partitions, floors and ceilings

NOTE Expressed in J.

3.29
fire model
a laboratory process, including both the apparatus and the mode of operation, intended to simulate a certain stage of a real fire

3.30
fire modelling
descriptions, using mathematical models, of the different interconnected physical phenomena which govern the propagation of a real fire

3.31
fire retardant (noun)
a substance added or a treatment applied to a material in order to suppress, reduce or delay the combustion of the material

3.32
fire scenario
a detailed description of conditions, including environmental, of one or more of the stages from before ignition to the completion of combustion in an actual fire at a specific location, or in a full-scale simulation

3.33
fire stability
the ability of an element of construction, load-bearing or non load-bearing, to resist collapse under fire exposure for a stated period of time under specified test conditions

3.34
flame front
the boundary of the combustion zone in the gaseous phase at the surface of a material

3.35
flame retardant treatment
a process whereby improved flame retardance is imparted to a material

3.36
flame spread
propagation of a flame front

3.37
flame spread rate
distance travelled by a flame front during its propagation, per unit time, under specified test conditions

NOTE Expressed in m/s.

3.38
flame spread time
the time taken by a flame front on a burning material to travel a specified distance on the surface, or to cover a specified surface area under specified test conditions

NOTE Expressed in seconds (s).

3.39
flaming (noun)
the process of continuation of flames after their first appearance

3.40
flammability
the ability of a material or product to burn with a flame under specified test conditions

3.41
flammable
capable of burning with a flame under specified test conditions

3.42
flash-over
the rapid transition to a state of total surface involvement in a fire of combustible materials within an enclosure

3.43
flashpoint
the minimum temperature to which a product must be heated for the vapours emitted to ignite momentarily in the presence of flame, under specified test conditions

NOTE Expressed in °C.

3.44
fractional effective concentration
FEC
ratio of the concentration of an irritant to that expected to produce a given effect on an exposed subject of average susceptibility

NOTE 1 As a concept, *FEC* may refer to any effect, including incapacitation, lethality or even other endpoints.

NOTE 2 When not used with reference to a specific irritant, the term *FEC* represents the summation of *FEC*s for all irritants in a combustion atmosphere.

3.45
fractional effective dose
FED
ratio of the exposure dose for an asphyxiant toxicant to that expected to produce a given effect on an exposed subject of average susceptibility

NOTE 1 As a concept, *FED* may refer to any effect, including incapacitation, lethality or even other endpoints.

NOTE 2 When not used with reference to a specific asphyxiant, the term *FED* represents the summation of *FEDs* for all asphyxiants in a combustion atmosphere.

3.46
full fire development
the transition to a state of full involvement of combustible materials in a fire

3.47
gasification
the transformation of a material partially or wholly into a gaseous state

3.48
gasify
to bring a material partially or wholly to a gaseous state

3.49
glowing
made luminous by intense heat

3.50
hyperventilation
rate and/or depth of breathing which is greater than normal

3.51
ignition temperature (minimum)
the (minimum) temperature of a material or of an ignition source at which sustained combustion can be initiated under specified test conditions, as defined in the test method

NOTE Ignition requires a sufficient volume of flammable gas and oxidant (air). Sustained combustion requires a sufficient rate of production of flammable gas. The minimum ignition temperature implies thermal stressing to infinite time. For practical purposes, the standard should define the minimum ignition temperature appropriately.

3.52
incapacitation
state of physical inability to accomplish a specific task, for example, the inability to take effective action to escape from a fire

3.53
large scale test
a test, the size of which exceeds that of a typical laboratory bench test

3.54
leakage current
electric current in an unwanted conductive path other than a short circuit

[IEV 151-15-49][1]

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[1] IEC 60050-151:2001, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

3.55
lethal exposure dose 50
LCt_{50}
exposure dose of a toxicant that, when inhaled, causes lethality in 50 % of a population all of which are the same species and all exposed under the same experimental conditions

[ISO/IEC 13943:2000, definition 110 modified]

3.56
light (verb)
to initiate combustion in the gaseous phase

3.57
lighted (adj.)
the state of a material after appearance and during persistence of flame

3.58
lighting (noun)
a) the first appearance of flame

b) the act of initiating combustion in the gaseous phase

3.59
linear burning rate
length of material burned per unit time under specified test conditions

NOTE Expressed in m/s.

3.60
mass burning rate
mass of material burned per unit time under specified test conditions

NOTE Expressed in kg/s.

3.61
mass optical density of smoke
optical density multiplied by a factor, $V/(\Delta mL)$, where V is the volume of the test chamber, Δm is the mass loss of the test specimen, and L is the light path length

3.62
minimum critical relative humidity
relative humidity that causes leakage current to exceed a defined level

3.63
minimum ignition time
the minimum time of exposure of a material to an ignition source to obtain sustained combustion under specified test conditions (see also *ease of ignition* and *exposure time*)

3.64
molten drips (noun)
falling droplets of molten material, either flaming or not

3.65
net calorific value; heat of combustion (J/kg)
see **net heat of combustion**

3.66
net heat of combustion

heat released per unit mass when a substance burns completely and the combustion products are in their standard states with the exception of water which is considered to be in the vapour state

NOTE The net heat of combustion is always smaller than the gross heat of combustion because the heat released by the condensation of the water vapour is not included.

[ISO/IEC 13943:2000, definition 86.3 modified]

3.67
opacity (of smoke)
the ratio (I/T)of incident luminous flux (I) to transmitted luminous flux (T) through smoke, under specified test conditions

3.68
optical density (of smoke)
the common logarithm of the opacity of smoke (lg (I/T)) (see also *specific optical density of smoke*)

3.69
predicted lethal toxic potency
calculated value for toxic potency, based on the constituents of chemical analysis of fire effluent and existing LCt_{50} data for these constituents

3.70
pyrolysis
irreversible chemical decomposition of a material under the sole effect of heat

3.71
pyrolysis front
boundary of pyrolysis at the surface of a material

3.72
reaction to fire; burning behaviour
the response of a material under specified test conditions in contributing by its own decomposition to a fire to which it is exposed

3.73
real scale test
a test which simulates an end-use situation in both size and surroundings

3.74
self-heating
a) an exothermic reaction within a material resulting in a rise in temperature in the material

b) heat generated by a *powered* electrotechnical product resulting in a rise in temperature in the product

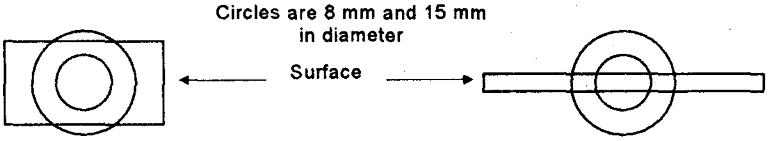
3.75
self-ignition
ignition resulting from self-heating

3.76
sensory irritancy
the action of toxicants on the eyes and/or upper respiratory tract causing a painful sensation. This may be a direct stimulus of specialized receptors or as a result of tissue damage caused by the toxicants

3.77
small scale test
a test which may be made on a typical laboratory bench

3.78
small parts
parts, where each surface lies completely within a circle of 15 mm diameter or where some of the surface lies outside the 15 mm diameter circle but in such a way that it is not possible to place a circle of 8 mm diameter on any of this remaining surface

NOTE When checking a surface, projections on the surface and holes which are not greater than 2 mm on the largest dimensions are disregarded.



3.79
smoke
a visible suspension of solid and/or liquid particles in gases resulting from combustion or pyrolysis

3.80
smoke obscuration
the reduction in visibility due to smoke

3.81
smouldering
the slow combustion of a material without light being visible and generally evidenced by an increase in temperature and/or by smoke, and/or by effluent

3.82
soot
particles, mainly carbon, produced and deposited during the incomplete combustion of organic materials

3.83
specific extinction area of smoke
extinction area of smoke divided by the mass loss of the test specimen

3.84
specific optical density of smoke
optical density multiplied by a geometric factor

NOTE 1 The factor is V/AL, where V is the volume of the test chamber, A is the exposed surface area of the test specimen, and L is the light path length.

NOTE 2 The use of the term 'specific', in this case, does not denote 'per unit mass' but rather denotes a quantity associated with a particular test apparatus and exposed surface area of the test specimen.

3.85
spontaneous ignition temperature
the minimum temperature at which ignition is obtained by heating, under specified test conditions, in the absence of any additional ignition source

NOTE Expressed in °C.

3.86
thermal inertia
product of thermal conductivity ($W \times m^{-1} \times K^{-1}$), density ($kg \times m^{-3}$) and heat capacity ($J \times K^{-1} \times kg^{-1}$)

3.87
thermal insulation
a material or an arrangement of materials which reduces the heat transfer rate

3.88
time/temperature curve (standardized)
the conventional time-related variation of temperature during standard fire resistance tests

3.89
toxicant
substance which causes an adverse effect upon a living organism

NOTE The mechanism can be physical and/or chemical.

[ISO/IEC 13943:2000, definition 171 modified]

3.90
toxicity
the inherent properties of a substance to produce adverse effects upon a living organism (irritation, narcosis, etc., death)

3.91
toxic hazard
the potential for injury or loss of life by exposure to toxicants with respect to their potency, quantity, rate of exposure and concentration

3.92
toxic potency
measure of the amount of toxicant required to elicit a specific toxic effect

NOTE The smaller the value of the toxic potency, the greater the toxicity.

[ISO/IEC 13943:2000, definition 169 modified]

3.93
tracking resistance
the ability of a material to withstand a test voltage, under specified test conditions, without causing electrical failure or ignition due to the formation of conducting paths on its surface

3.94
ultimate stability failure
in a standard fire resistance, test, a change in the test element which is sufficiently important to result in its rupture very shortly afterwards

3.95
visibility
maximum distance at which an object of defined size, brightness and contrast can be seen and recognized

3.96
volume fraction (of a gas in a gas mixture)

ratio *x*/*y*, where *x* is the volume that the gas alone would occupy at 25 °C and 0,1 MPa, and *y* is the volume that the gas mixture would occupy at 25 °C and 0,1 MPa

NOTE 1 Usually expressed in parts per million (ppm), and often wrongly described as a concentration.

NOTE 2 The concentration of a gas in a gas mixture at temperature *T*, and at pressure *P*, can be calculated from its volume fraction (assuming ideal gas behaviour) by multiplying the volume fraction by the density of the gas at temperature *T*, and at pressure *P*.

3.97
wicking

transmission of a liquid through or over a particulate or fibrous material by capillary action

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